ISBN: 978-989-8533-30-2 © 2014

WORK-INTEGRATED LEARNING WITH WORK-INTEGRATED LEARNERS

Martin Gellerstedt and Tobias Arvemo
University West Sweden

ABSTRACT

The digital era gives many new opportunities for higher education. Especially online education makes it possible to reach new groups of students like, for instance, full time working professionals. This case study investigates an online course in applied statistics constructed to attract "non-traditional students" such as full-time working professionals. The course was constructed using the Work Integrated Learning (WIL) approach as well as guidelines for statistics courses (GAISE) and online courses. The main goal of the article is to investigate if the course attracted the participants that were intended, and to summarize the pedagogical experiences from the course. Among the findings are that the course succeeded in attracting "non-traditional students", it is also found that the concept of WIL and GAISE helps increase the participant's interest in, and perceived usability of, statistics. Furthermore, the concept of WIL can be enhanced, both for the traditional and "non-traditional" students, by inviting the "non-traditional students" to share statistical problems from their workplace. This opens up for the pedagogical concept of using the participants in the course as a resource for WIL and hence building a course with the students rather than for the students.

KEYWORDS

Work-integrated learning, Non-traditional students

1. INTRODUCTION

Today's heavily competitive employment market with shifting economic and demographic factors implies new challenges for higher education. Even though a degree from higher education may increase the chance of employment, a lot of companies demands working experience as a complement to the degree. Furthermore, in order to be competitive, companies are in need of continuous development of competence among existing employees (Agha et al 2012). It is suggested that higher education institutions must proactively examine and re-develop curricula in order to offer career development for both traditional and non-traditional students (Betts et al 2009). It is further suggested that curricula must support career development by applying and actualizing knowledge and skills in real-life settings, e.g. by adopting work-integrated learning (ibid).

From a company perspective, the development of competence, must be ongoing continuously due to the dynamic and rapid changes in the market. This continuous learning should be integrated with the everyday work and tasks (Tynjälä 2008). Moreover, companies want to find ways of offering learning activities which increase the competence without too much interference with everyday work, and preferably with as small costs as possible. To meet this challenging requirements Information and Communication Technology (ICT) may be a suitable platform for developing efficient learning tools and systems (Chuang et al 2008).

The digital era certainly offers new possibilities for higher education and via online education new groups of students could be reached, e.g. full working individuals who want to upgrade their competence. The technical development for distance education gives new opportunities and there are a lot of success stories (e.g., Volery & Lord 2000, Moore & Kearsley 2011), but research also points out potential gaps between promises and reality (e.g., Wilner & Lee 2002, Hartnett 2012).

In this study, an online course in applied statistics is used as a case. This course was designed in a way that allows combining the studies with work. Our intention was to attract "non-traditional" students, in this case participants who already are working, part or full-time. Especially we hoped to recruit participants who already are in the need of increased statistical competence within their profession or individuals who wants to advance/transmit their career towards more analytical work tasks. The design of the course was based on

guidelines and pedagogical principles for teaching statistics and efficient online education. Furthermore the most important pedagogical approach was to use work-integrated learning. In short, we wanted to offer a modern online course and work-integrated learning for work-integrated learners.

In this article we will briefly discuss work-integrated learning and present how our course was designed. But the primary aim is to present results from evaluations and summarize our experiences by answering the following questions: Did we attract the participants that we intended? What pedagogical experiences do we have after running this course for six years?

2. WORK-INTEGRATED LEARNING

The course used as a case in this article is offered by University West. Work-integrated learning (WIL) has been an important part of University Wests profile already since it started, even though the perception and implementation of WIL varies (Kjellén and Tegnborg 2003). Generally work-integrated learning can be described as a pedagogical philosophy that emphasizes the values and quality gained by integrating theoretical studies with work-life experiences (Svensson and Östlund 2007). The implementation in practice may be done in numerous ways, but one way of categorizing related activities is the following: (taxonomy adopted from Kjellén and Svensson 2014):

(i) Using Practice as Inspiration (“Case”)

This category encompasses instructional designs such as “Teaching Cases”, “Practice-Oriented Simulations and “Role-Plays”, i.e. activities that to some extent are related to practice and may be more or less edited versions of actual situations.

(ii) Bringing Practice to Class (“Imprint”)

This category contains the use of imprints of practice as resources in educational practice. Examples are inviting “Guest Lecturers” and importing artefacts from various professional fields, e.g. “Commercial programming Code” and “Annual Reports” from existing corporations.

(iii) Utilising Professional Tools (“Tool”)

For the activities in this category, the point is to train students to use de-facto standard tools of a profession in the educational design, such as “Reference manuals or databases” (online or printed), “State of the art software packages”, or “Professional Routines and Procedures”.

(iv) Bringing Class to Practice (“Field”)

The activities in this category comprises empirically oriented fieldwork, where students leave campus in order to experience and study real professional settings as part of their education, e.g. “Projects” or “Thesis Work”.

3. GUIDELINES FOR TEACHING STATISTICS

Two decades ago a report called for a change in statistical education suggesting a greater focus on statistical thinking more than just handling the mathematics (Cobb 1992). The report has had great impact and generated several changes in statistical education regarding content (more focus on data analyses, less on probability theory), pedagogy (more active learning, less passive instruction), and technology (e.g., using statistical software), (Moore 1997). In order to summarize the experiences obtained during the reformation of statistical education, the American Statistical Association (ASA), developed guidelines for assessment and instruction for an introductory course in statistics (GAISE, ASA 2005). A review of the current status and a presentation of available web-resources related to statistical education are given by Tishkovskaya and Lancaster (2012).

4. GUIDELINES FOR ONLINE COURSES

There are a number of available guidelines related to efficient online education. The design of our statistical course was influenced by the work by Graham et al. (2001) which includes the following seven principles, which could be regarded as a practical lens useful for developing and evaluating online courses: "Good practice"…

i. encourages student-faculty contact
ii. encourages cooperation among students
iii. encourages active learning
iv. gives prompt feedback
v. emphasizes time on task
vi. communicates high expectations
vii. respects diverse talents and ways of learning

5. DESIGNING THE COURSE

The course was designed by weighing up the following sources of information and aspects:

- Our own consolidated experiences from running introductory courses in statistics on campus for 20 years and online for a decade.
- Guidelines of teaching statistics (GAISE) described above
- Pedagogical principles for online teaching
- Adopt work-integrated learning
- The targeted populations are "non-traditional students", i.e. the course should be possible to follow also for working participants

A more detailed description of the course design is given elsewhere (Gellerstedt et al 2014), but the most important concepts related to WIL and for attracting participants already on the labor market, are described below.

Some examples of strategies supporting WIL (category according to taxonomy described above is within brackets):

- Avoiding "naked data", i.e. use real data from media, news, research, etc as often as possible (Case)
- "Learning by doing" – use SPSS for producing statistics and focus on interpretation (Tools)
- Set up a complete survey project, from identifying themes, constructing questions/answers, collecting data, data management, analyses and presentation (Field). This survey project is intended to mimic a real survey project as close as possible.

Some examples of strategies for facilitating participants that are working

- The course is divided in modules, with "checkpoints" where solutions to assignments must be submitted (these deadlines are the only time constrains in the course). This structure is intended to support an even pace during the course.
- Each module supported by detailed guidelines, including what to read, what to do, deadlines and an estimate of required time for fulfillment.
- Running the course in half speed, i.e. a duration of ten weeks instead of five (full time studies).
- No physical meeting, no synchronous activities – participants are free to study whenever they have the possibility. Well thought-through self-instructed learning-by doing assignments in SPSS.
- Standardized and professional pre-recorded video lectures to view on demand.
- Active discussion boards for lively discussions and prompt replies on e-mails.
- Participation – teachers frequently visiting the home page, writing comments and responding to questions

The name of the course is: "Applied statistics – to collect and summarize data" and attracts around 100 participants each time.

As mentioned previously we hoped that the course would in general attract participants who also are working. In particular we were interested in recruiting individuals who already uses statistics in their profession or individuals who wants to advance/transmit their career towards more analytical work tasks.

6. DID WE ATTRACT THE PARTICIPANTS THAT WE INTENDED?

Immediately when the course started for the first time there were a number of indications implying that the population of participants differs from traditional students attending the corresponding campus course. The activity on the learning management system (LMS) was heavily concentrated to evenings and weekends, indicating working participants. The presentations made at the LMS revealed working place for a large proportion of all students, e.g. working at a bank, in media, with marketing or with opinion polls. The initiated questions raised in e-mails and on the discussion board gave the same impression.

Inspired by these initials indications and driven by curiosity, we decided to investigate the population in more detail. A first small study, which was a questionnaire complemented with interviews via telephone, we found that roughly 80% of all participants worked (20% part time and 62% full time). Thus it was evident that the course attracted working participants.

In 2012 a more comprehensive survey was performed both before and after the course, comparing campus (n=54) and online students (n=44). This survey included a comprehensive set of variables, e.g. demographic variables, beliefs about statistics, interests in working with statistics, learning styles and strategies, self-confidence, procrastination, locus of control, attitudes towards the subject before and after the course.

The results show that online students were older (campus: average 23 years, online average 34 years), more experienced and not equally interested in achieving the credits for the course. We also found that the online students and had more positive belief about statistics, e.g. that statistics is exciting, useful and a desirable ingredient in a future occupation. There were no significant differences between student populations regarding the psychological variables: self-efficacy, locus of control, and procrastination.

The proportion of participants who were working was consistent with the previous smaller study. Roughly 80% of the online participants worked (20% part time, 57% full time). Among campus students 65% worked part time (no full time workers). Thus, the majority of the online participants are working. An interesting follow-up question is whether they are using statistics in their current profession? The questionnaire gave us the following figures: 84% of those who are working full time were already using statistics in their profession. Among the part time workers the corresponding figure was 44%. Among the participants who worked full time but not with statistics right now, 96% wanted to work with statistics in the future. Among the part time workers and non-workers the corresponding figure was 67% and 60%.

These figures support that a large part of the participants have the incentives to increase job security, career advancement, prepare displacement or transition to other jobs. As a matter of fact, we have also had some graduated statisticians who have attended the course in order to update the competence and to learn new tools and develop skills.

In sum, the online course attracted a completely different population than “traditional students” attending a course on campus. The stereotype for an online participants is a middle aged person with working experience, interested and motivated, and either work with statistics right now or want to do so in the future.

7. IMPLICATIONS FOR EDUCATORS –WORKING WITH “NON-TRADITIONAL STUDENTS”

For us, as teachers, it is certainly pleasant to have interested and motivated participants who will have a direct use of the achieved knowledge and skills developed in the course. But, with a completely new kind of population of participants, one may wonder if there is a need for changing the pedagogical strategies?

A first question is related to working hours. Should we adjust our working hours due to the fact that the participants are using the LMS at evening and on weekends? Well, we have decided to not make any adjustments. Instead we have encouraged all participants to help each other and to keep a lively discussion on the discussion board. And, we have as a policy stated that our aim is to reply on questions and to take part at the discussion board within one working day, maximum two. We have also decided to spend an hour or two on the weekends were a deadline is set for submitting an assignment. In short, we have just made a small adjustment in working hours and adopted a policy for feed-back on the LMS. Beyond practical matters as working hours there are perhaps more important issues to consider, e.g. if the learning styles is different for online students than traditional campus students.

When we analyzed learning styles we found that a majority of online students (two out of three) generally preferred a reflective learning style while the situation is the other way around on-campus, where roughly two out of three students preferred more active learning. There was also a difference in study approach showing that online students to a higher degree focuses on deep learning strategies. We did some explorative analysis, which indicates that attitudes towards statistics is related to study approach: students who find the topic interesting and useful use a deeper approach than students with a less enthusiastic view of the topic. Thus the difference in learning strategy may be explained by the difference between traditional and non-traditional students described in previous section. Another difference related to preferred learning style is that the majority of online participants preferred working alone and did not wanted group assignments, while the situation on campus was the other way around. This goes hand in hand with the design of our course. In the campus version students are recommended to work in a group with three participants per group, while online participants are supposed to work individually.

Regarding the overall pedagogical strategies (WIL and GAISE) we asked if the course was as interesting and if it was as useful as expected? Answering alternatives were: less than expected / as expected / more than expected. The distribution of answers was:

Interesting? (4% / 15% / 81 %)

Useful? (4% / 27% / 69%)

These results were interpreted as good indications implying that the pedagogical approaches especially the WIL-approach and GAISE gives good results in terms of interest and usability.

However, when analyzing the WIL-concept more in detail it is obvious that the character of the online participants may be a valuable resource in the course, which could strengthen the WIL-concept even more. When we started the course for the first time we noticed that there were frequent mail from participants with a practical issue they had to deal with in their job. Sometimes the questions were directly related to the theoretical content of the course and sometimes out of the scope of the course. Anyway, we decided that this sort of "consultancy business" could be used as an exciting advantage in the course. We decided to start a new forum at the LMS a kind of discussion board which we called: "Work related issues board" (WRIB). In this forum participants could ask any kinds of questions, i.e. questions related to their work or reflections regarding a new study presented in media, etc. All questions are allowed!

The WRIB has over the years included a mixture of questions from different fields. Some examples of addressed issues are: how to handle drop-outs in clinical trials, how to measure accuracy in quality control, how to handle sensitive questions in a survey, how to present risk factors and standard for quality control in industry, just to mention some examples.

The WRIB has certainly strengthen our concept with work-integrated-learning (WIL). As mentioned above, activities related to WIL may include "Cases", "Imprints", "Tools" and "Field work", and as a matter of fact the participants themselves contributes to all these activities. The WRIB together with the regular discussion board and in combination with the joint survey project in the end, the input from the work-experienced participant is a really valuable asset.

We regard this as a work-integrated-learning option, were other participants, especially traditional students could see that statistics are used in reality. In this way, the non-traditional students actually contribute with work-integrated-learning contents to the course. Teachers in the course finds it interesting and intellectually stimulating answering these, sometimes tricky, questions.

As mentioned above the online students are older and have working experience, a majority are in fact working with analyses already. This can been seen in the final examination project which includes making a survey. The online course have a higher dropout rate (44%) than the campus course (8%). But, among the participants who fulfills the examination there is a higher degree of examinations graded as "pass with honour". Thus the non-traditional students have a lower degree of completion, but on the other hand, the completers produce higher quality assignments than campus students.

The dropout rate on this course is roughly the same or slightly lower than other online courses offered at Universities in Sweden. When we have analyzed the reasons for drop out, by analyzing answers in the questionnaires and by making follow-up phone interviews, we have made some interesting findings. Around every fifth students never start the course at all. These drop-outs could not be explained by failing pedagogical concepts. During phone interviews, one students had not understood the information, one student had taken a similar course at another university starting before this course, all other drop-outs among these nearly "non-starters" had external explanations, e.g. moving, illness, travel, changing work.

The non-starters corresponds to approximately half of all drop-outs. The other half are participants who have started but not completed. One explanation is that the participants have no, or very weak, incentives for delivering the rather comprehensive final assignment. Around every sixth participant claimed in the survey that it was not important to get the credits for the course. We estimate that around half of the remaining drop-outs actually are participants that have followed the course just for fun, but without incentive to take the credits and therefore don't "waste their time" with the final assignment.

It is nice to have students who attend the course just due to a pure interest in the theory rather than achieving the academic credits, but in Sweden a proportion of the financial budget we receive from the government is based on completion rate. Naturally, this is not a strong incentives for participants. So the question is how we could increase completion rate? One idea is to develop examination assignment which are too hard to resist, either due to interest or direct use in the profession. How to use the fact that a majority of these "non-traditional students" have professions were statistics is needed is a challenge that we are currently working with.

Thus, our next pedagogical challenges is to consider how we can adjust the course and make it more tailor-made for each individual. If the course starts with a small questionnaire regarding e.g. learning style, interest and profession it would be possible to offer some degree of individual adaptation. Assignments may be possible to adapt to each individual work place. This may increase the Wil-concept even more and may increase completion rate, however it is demanding and it is a challenge to find efficient ways of realizing such ideas.

8. FINAL REMARKS – CONCLUSION

We have found that our course fulfilled the intentions and recruited non-traditional students. The participants are older, experienced, interested and motivated, and a majority are working. There are several implications regarding pedagogical challenges for educational institutions arranging education for such non-traditional students. Our most important finding is that the concept with work-integrated learning can be enhanced by the participants. Originally our idea was to offer work-integrated courses in statistics *for* work-integrated learners. But, according to our experience the working experience among the participants is a really valuable assets which could be used proactively in the course. The course is a matter of co-creation between teachers and participants. In conclusion, nowadays our idea is to offer work-integrated courses in statistics *with* work-integrated learners, rather than *for* work-integrated learners.

REFERENCES

Agha, S. Alrubaiee, L. & Jamhour, M. (2012).Effect of core competence on competitive advantage and organizational performance. International Journal of Business and Management, 7 (1), 192-204

American Statistical Association. (2005). Guidelines for Assessment and Instruction in Statistics Education, available at: http://www.amstat.org/education/gaise/

Betts K., Lewis M., Dressler A., Svensson L. (2009). Asia-Pacific Journal of Cooperative Education, 10(2), 99-119

Chuang, C.-K., Chang, M., Wang, C.-Y., Chung, W.-C., & Chen, G.-D. (2008). Application of E-Learning to PilotTraining at TransAsia Airways in Taiwan. International Journal on E-Learning, 7(1), 23-39.

Cobb G. (1992). Heeding the Call for Change: Suggestions for Curricular Action (MAA Notes No. 22), chapter Teaching Statistics, pages 3–43. The Mathematical Association of America, Washington DC

Gellerstedt M, Svensson L, Östlund C. Navigating in a new pedagogical landscape with an introductory course in applied statistics. In MacGillivray, H., Martin, M., and Phillips, B. (eds) Topics from Australian Conferences on Teaching Statistics:

OZCOTS 2008-2012, Springer Science+Business Media, New York 2014.

Graham, C., Cagiltay, K., Lim B-R., Craner, J. and Duffy, T.M. (2001). "Seven Principles of Effective Teaching: A Practical Lens for Evaluating Online Courses" The Technology Source, March/April. Retrieved from: http://technologysource.org/article/seven_principles_of_effective_teaching/

Hartnett, M. (2012). Relationships between online motivation, participation, and achievement: More complex than you might think. Journal of Open, Flexible and Distance Learning, 16(1), pp. 28–41.

Kjellén, B. & Tegnborg, A. (2003), What Teachers Think is WIL Perceptions and Proposals in a Swedish University Department. Paper presented at 13th World Conference on Cooperative Education, Rotterdam.

Kjellén B., Svensson L. (2014). Work-Integrated Learning in the Classroom. WACE 10thInternational Symposium on Cooperative & Work-Integraded Education. Trollhättan, Sweden

Moore, M. G., & Kearsley, G. (2011). Distance education: A systems view of online learning (3rd ed.). Belmont, CA: Wadsworth; Cengage Learning.

Moore D. (1997). New pedagogy and new content: The case of statistics.International Statistical Review, 65:123–165

Svensson L., Östlund C. (2007) Framing Work-Integrated e-Learning with Techno-Pedagogical Genres., Educational Technology & Society vol 10 (4).

Tishkovskaya S., Lancaster G.A. (2012). Statistical Education in the 21st Century: a Review of Challenges, teaching Innovation and Strategies for Reform. Journal of Statistics Education 20 (2).

Tynjälä, P. (2008). Perspectives into learning at the workplace. Educatonal Research Review, 2(3), 130–151.

Volery, T., Lord, D. (2000) Critical success factors in online education, The International Journal of Educational Management 14 (5), pp. 216-223.

Wilner, A., & Lee, J. (2002). The promise and the reality of distance education. Update. Washington, D.C.: National Education Association, Office of Higher Education, 8, 3.